NASA Facts

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NASA Sounding Rockets

NASA suborbital sounding rockets provide an inexpensive means to conduct space, microgravity and Earth science research. In addition, they have proven to be a valuable test bed for new technologies for future satellites or probes to other planets.

Black Brant XII Sounding Rocket

The payloads, which rival in complexity to small satellites, range from atmospheric probes to astronomy telescopes and detectors.

With a 99% vehicle success rate of more than 100 launches since 1995, NASA sounding rockets deliver for customers, which include corporations, universities and government agencies.

Sounding Rocket Profile

NASA currently uses 13 different sounding rockets and conducts about 25 launches yearly. The rockets are in a variety of sizes from the single-stage Super Arcas, which stands 10 feet (3 meters) high to the four-stage Black Brant XII at 66 feet (20 meters) tall.

These rockets can carry scientific payloads of various weights up to 1213 pounds (550 kilograms) to altitudes from 30 miles (48 kilometers) to more than 800 miles (1,287 kilometers).

The flight profile of a sounding rocket follows a parabolic trajectory – it goes up and comes back down. Flight time is less than 30 minutes. Following launch, as a rocket motor uses its fuel it separates from the vehicle and falls back to Earth. The payload continues into space after separating from the motor(s) and begins conducting the experiment. When the experiment is completed, the payload reenters the atmosphere and a parachute is deployed, bringing the payload gently back to Earth. The payload is then retrieved. By retrieving the payload, tremendous savings can be achieved because the payloads or parts of the payload can be refurbished and flown again.

Launch Sites

Sounding rockets are routinely launched from established sites at Wallops Island, Va., White Sands Missile Range, N.M., and Poker Flat Research Range, Alaska, as well as sites in Norway and Sweden.

The mobility of the sounding rockets allow the research to be conducted where the science occurs. The versatile rockets also can be launched from temporary launch ranges. In the past, launch campaigns have been conducted from Puerto Rico, Brazil, Greenland and Australia.

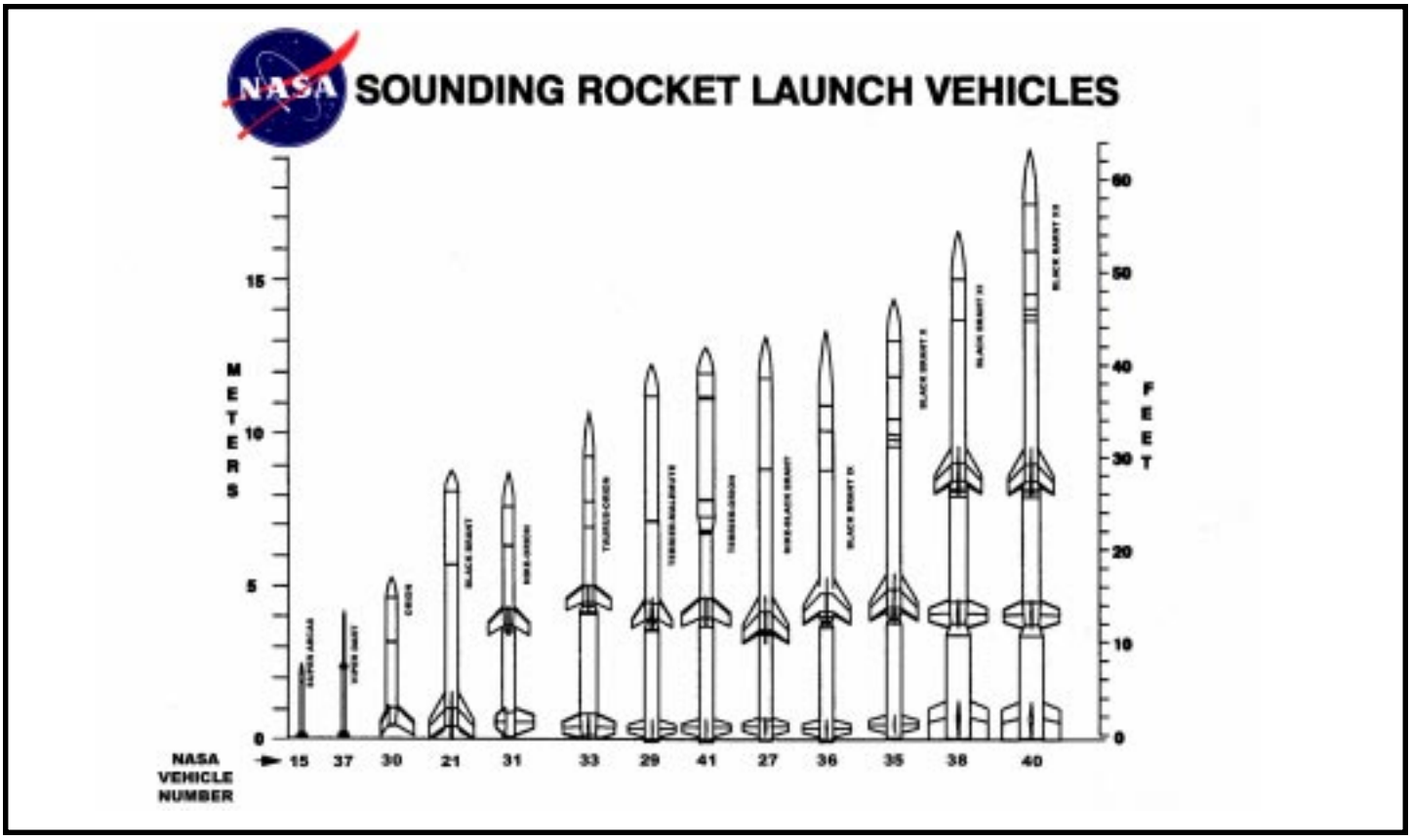
Timing is Important

There are two aspects of timing – getting the payload ready for flight and launching into the science event when it occurs. NASA sounding rockets meet both of these important aspects of science research.

Sounding rocket on the launcher on Wallops Island.

From project initiation to launch, depending on the complexity of the payload and the priority of the project, sounding rocket missions can be readied in six months to two years, providing one of the quickest avenues to get an experiment into space.

In addition, sounding rockets provide one of the few ways to conduct in situ measurements in space. From the Equator to the Arctic Circle, sounding rockets have delivered payloads into ionospheric events or have coordinated launches to the minute with other research instruments both on the ground and in the air, including satellite overpasses.



Validating New Instruments and Developing New Technology

Sounding rockets continue to serve as a low-cost testbed for new scientific techniques, scientific instrumentation, and spacecraft technology that are eventually flown on satellite missions.

Time-lapse photograph of a rocket launch into an aurora at Poker Flat Research Range, Alaska.

Compton Gamma Ray Observatory, Solar and Heliospheric Observatory, Transition Region and Coronal Explorer and other recent NASA satellite missions have been enabled by technology and techniques developed using sounding rockets.

The low cost of sounding rocket access to space fosters innovation: instruments and/or technologies which are not sufficiently developed to warrant the investment of satellite-program scale funding are often "prototyped" with initial space testing of sounding rockets.

Teaming with NASA

NASA issues Research Announcements each year for sounding rocket flight proposals. These anouncements can be found at: http://www.hq.nasa.gov/office/oss/research.htm The Research Program Management Division, Office of Space Science, NASA Headquarters, administers the announcements.

Sounding rockets also are used to conduct reimbursable missions with the customer paying for NASA support. For further information, contact the NASA Sounding Rockets Office, Wallops Flight Facility, (757) 824-2202.

Preparing for the Future

Historically, sounding rocket missions have provided an excellent research opportunity for graduate students at the Master's and Doctorate level.

Student launch program.

In addition, high school and undergraduate students receive hands-on education through the NASA Student Involvement Program and the Student Launch Program. Both involve students in the full research process from experiment development through data analysis.

For further information, visit NASA's sounding rockets homepage:
http://www.wff.nasa.gov/pages/soundingrockets.html

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